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} Associate Editors

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THE NEW ENGLAND BOTANICAL CLUB

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NOTES ON ORCHIDS FROM LA BAYAMESA, CUBA

JOHN H. BEAMAN[1] AND RICHARD EVANS SCHULTES[2]

IN JULY, 1955, the members of Harvard University's course in Tropical Botany (Biology 215) carried out plant collecting activities in several parts of Cuba. A number of the collections are of interest as representing new stations for a genus or species or as the second or third time a rare species has turned up on the Island. This appears to be especially true of the orchids gathered on the Pico de La Bayamesa. The following notes on the orchids from this second highest peak in Cuba are offered because of the rarity or phytogeographical interest of a number of the finds.

The course comprised four graduate students at Harvard University: Mr. Arthur S. Barclay, Mr. John H. Beaman, Mr. Jack A. Freeberg and Mr. Tchang-Bok Lee; and the instructor, Dr. Richard Evans Schultes. Studies of the forests at or near the summit of La Bayamesa, between 4900 and 5200 feet, were carried on between July 16 and 19, 1955. Intensive logging operations were in progress at this time, and it was possible to reach the top of the mountain by truck. We wish to acknowledge our gratitude to Señor Antonio Moreno, administrator of the operations, for his friendly help which enabled us to visit the area and to spend four very productive days at the summit of the mountain.

Relatively little botanical collecting has been carried out in the Sierra Maestra, that east-west ridge skirting the southwestern

[1] Assistant Professor, Michigan State University.

[2] Curator, Orchid Herbarium of Oakes Ames, Botanical Museum, Harvard University.

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coast of the Cuban Provincia del Oriente. Pico Turquino, the highest mountain of Cuba, rising to over 6,000 feet and Pico de La Bayamesa, the second highest, lie relatively close together. Several collecting trips have gathered material from Turquino and from the valleys between Turquino and La Bayamesa. The following notes constitute apparently the first published records of orchids from La Bayamesa.

Most of the orchids enumerated below have been determined by the writers at the Orchid Herbarium of Oakes Ames of the Botanical Museum of Harvard University. The collections of *Lepanthes*, *Pleurothallis* and *Stelis*, have been identified by Mr. Leslie A. Garay, Assistant Curator of the Herbarium of the University of Toronto in Canada. Specimens of each collection cited have been deposited in the Ames Herbarium.

Reference to the distribution of species is based on a study of the material in the Ames Herbarium and on reports in the two modern treatments of Cuban orchids: Julian Acuña, "Catálogo descriptivo de las orquídeas cubanas" Estac. Exper. Agron. Santiago de Las Vegas Bol. No. 60 (1939) [June, 1938]; Hermano León, "Flora de Cuba," Vol. 1, Contrib. Ocas. Mus. Hist. Nac. Col. La Salle No. 8 (1946).

The data on the labels of the collections cited below are the same for each number and are as follows:

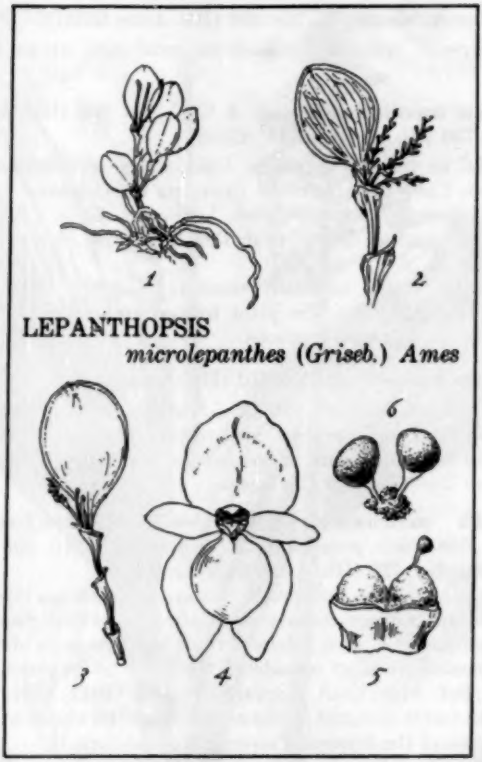
Cuba: *Province of Oriente*, Sierra Maestra, Pico de La Bayamesa. North slope. Altitude 4900–5200 feet. July 16–19, 1955. Coll. *Harvard Course in Tropical Botany No. 000* (R. E. Schultes, A. S. Barclay, J. H. Beaman, J. A. Freeberg, T-B. Lee).

Each collection is cited in the text only by its collection number and the number of the specimen in the Ames Herbarium. For convenience, the genera are listed alphabetically and not in phylogenetic order.

Calanthe mexicana Reichenb. f. No. 597 (Hb. Ames 68351; 68354).

This terrestrial orchid, known from Jamaica, southern Mexico, Guatemala, Costa Rica and Panama, is rare in Cuba, having been found only in the Provincia del Oriente. Acuña cites it from Mt. Líbano but indicates that he saw no material from Cuba. That it is rare on the island is shown by the fact that the collection cited above is the first material from Cuba in the Ames Herbarium.

Correll (in Lloydia 10 (1947) 214) has separated the Antillean material of *Calanthe* as a variety: *C. mexicana* var. *lanceolata*. This variety is known from Jamaica, Haiti and the Dominican Republic. Our material



Lepanthopsis microlepanthes (Griseb.) Ames. Drawn by B. Ames.

from eastern Cuba, however, does not seem to diverge enough from the variable *Calanthe mexicana* to include it in this rather poorly defined variety.

Dichaea glauca (Sw.) Lindl. No. 603 (Hb. Ames 68364).

Dichaea glauca, distributed through Jamaica, Hispaniola, Mexico and Guatemala, occurs in Cuba apparently only in the eastern regions where it has been collected previously on Sierra Maestra, Gran Piedra, Loma del Gato and Punta de Palmamocha.

Dichaea trichocarpa (Sw.) Lindl. No. 687 (Hb. Ames 68232); No. 796 (Hb. Ames 68349).

Known also from Jamaica and Hispaniola, *Dichaea trichocarpa* occurs in Cuba only in the Provincia del Oriente, where it has been cited by Acuña from Pico Turquino and Loma del Gato.

Epidendrum cochleatum L. No. 609 (Hb. Ames 68361).

The widespread tropical *Epidendrum cochleatum* occurs throughout Cuba.

Epidendrum crassilabium Poepp. & Endl. No. 607 (Hb. Ames 68236; 68237); No. 760 (Hb. Ames 68348; 68355).

Widespread in tropical America, *Epidendrum crassilabium* has been reported from Cuba only from the Provincia del Oriente. In the Ames Herbarium, there is material from Loma del Gato. Acuña (under *Auliza Wilsoni* Acuña) cites it from Pico Turquino, Sierra de Moa and Sierra Maestra.

The collection *760* is unusually small vegetatively, but this may be due to excessive sunlight. The plant was growing on fallen trunks in a clearing made by logging operations.

Epidendrum repens Cogn. No. 601 (Hb. Ames 68362).

Known from the Antilles, Mexico, Guatemala and northern South America, *Epidendrum repens* is apparently confined in Cuba to the Provincia del Oriente, where it has been reported from Sierra Maestra between Pico Turquino and Bayamesa.

Fuertesiella pterichoides Schltr. *Cranichis grandiflora* Ames & Schweinf. *Fuertesiella grandiflora* (A. & S.) Schltr. No. 598 (Hb. Ames 68238; 68239); No. 772 (Hb. Ames 68240).

Two species have been included in this genus which has been split from *Cranichis* on rather minor characters: *F. pterichoides* from Santo Domingo and *F. grandiflora* (A. & S.) Schltr. from the Provincia del Oriente in Cuba. Schweinfurth later considered the latter to be synonymous with the former (Bot. Mus. Leafl. Harvard Univ. 11 (1944) 173). An examination of the ample material in the collections cited above would support this disposition of the concept *Fuertesiella grandiflora*.

Fuertesiella grandiflora in Cuba is known from Loma de San Juan, Sierra Maestra and Pico de La Bayamesa.

Isochilus linearis (Jacq.) R. Br. No. 699 (Hb. Ames 68235).

Widespread throughout tropical America, *Isochilus linearis* has been collected in Cuba in the mountainous parts of Santa Clara, Las Villas and Oriente. It is especially common in the Provincia del Oriente.

Lepanthes Ekmanii Schltr. No. 792 (Hb. Ames 68583).

Lepanthes Ekmanii has previously been reported from Pico Turquino.

Lepanthes Lindmaniana Schltr. No. 611 (Hb. Ames 68581).

Lepanthes Lindmaniana, known hitherto from Loma del Gato, is endemic to eastern Cuba.

Lepanthes longicruris Schltr. No. 612 (Hb. Ames 68582).

An endemic of Provincia del Oriente, this species has been reported previously from Loma del Gato and San Juan.

Calanthe mexicana. Drawn by G. W. Dillon.

Lepanthes pergracilis Schltr. No. 600 (Hb. Ames 68359; 68360); No. 765 (Hb. Ames 68358).

Lepanthes pergracilis has been cited previously from Cuba only from Pico Turquino. This second report—from the neighboring peak of Bayamesa—emphasizes its endemism in easternmost Cuba.

Lepanthopsis microlepanthes (Griseb.) Ames. *Pleurothallis microlepanthes* Griseb.

Lepanthes Leonii Schweinf. ex León. No. 602 (Hb. Ames 68579).

Lepanthopsis microlepanthes, described originally from Jamaica, has since been collected in eastern Cuba (Garay in Orch. Journ. 2 (1953) 468), where it is known from Loma del Gato and La Bayamesa.

Malaxis domingensis Ames. No. 606 (Hb. Ames 68230).

The type of *Malaxis domingensis* is from the Dominican Republic. It has been known from Pico Turquino in Cuba.

Malaxis umbelliflora Swartz. No. 604 (Hb. Ames. 68357). No. 606A (Hb. Ames 68231). No. 749 (Hb. Ames 68356).

Malaxis umbelliflora is known throughout the West Indies, from Cuba to Trinidad. From Cuba, it has been collected only in the Provincia del Oriente: from Lomo del Gato and Sierra de Nipe.

Pleurothallis prostrata Lindl. No. 613 (Hb. Ames 68584).

Pleurothallis prostrata is apparently a rare endemic of the Provincia del Oriente. It seems to have been collected previously only by Wright a century ago.

Pleurothallis racemiflora (Sw.) Hook. No. 599 (Hb. Ames 67882; 68363).

Pleurothallis racemiflora, known also from Jamaica and questionably from Venezuela, is not uncommon in the Provincia del Oriente. It has been reported from Pico Turquino, Sierra Maestra, Lomo del Gato and Gran Piedra.

Pleurothallis ruscifolia (Jacq.) R. Br. No. 608 (Hb. Ames 67878; 68233); No. 787 (Hb. Ames 68353); No. 798 (Hb. Ames 68352).

Widely dispersed in the West Indies, Middle and tropical South America, this species of *Pleurothallis* has been collected in Cuba only in the Provincia del Oriente, where it has previously been known from Pico Turquino and Loma del Gato.

Psilochilus macrophyllus (Lindl.) Ames. No. 605 (Hb. Ames 68350).

Psilochilus macrophyllus, ranging through the Antilles and tropical parts of Middle America to Venezuela and Peru, has been collected in Cuba only in the Provincia del Oriente from Sierra de Nipe, Baracoa, Pico Turquino, Loma del Gato and Pico de La Bayamesa.

Stelis ophioglossoides Swartz. No. 610 (Hb. Ames 68580).

Widely distributed in the West Indies and British Guiana, *Stelis*

ophioglossoides is known in Cuba apparently only from the more tropical Provincia del Oriente. Mr. Garay, who determined the collection cited above, indicates that it is a "small form" of the species.

Xylobium palmifolium (Sw.) Benth. ex Fawcett. No. 700 (Hb. Ames 68234); No. 793 (Hb. Ames 68365).

This species, cited from Cuba by Fawcett & Rendle, is rare on the island. There has been no Cuban representation of it in the Ames Herbarium, and both Acuña and Brother León, in citing it, indicate that they have seen no specimens of it. It is known also from Jamaica, Haiti, the Dominican Republic and Trinidad.

NOTEWORTHY HEPATICAE FROM VIRGINIA

R. M. Schuster and P. M. Patterson[1]

The bryophytes, and mosses in particular, have been collected over various parts of the state during the past few years (Patterson 1950, 1951, & 1955). While many species have been reported, many others are expected to occur, particularly in unusually favorable habitats. Judging from past explorations, among the more critical areas in the state are the Dismal Swamp and adjacent territory of the southeastern coastal plain from which more range extensions may be expected; and White Top and Mt. Rogers, the highest points in Virginia, where bryophytes typical of the northern coniferous forest have been found as well as a group of species endemic in or disjunct to the southern Appalachians.

This paper reports the results of collections from each of these areas. The Dismal Swamp area was visited on April 2 and 3, 1955, and the mountain peaks on June 9 & 10, 1956. Collections were made in the Dismal Swamp in the mature forest on the east side of Lake Drummond between the origins of the Feeder and Portsmouth Ditches. The area designated as Nansemond (County) is a small area of swampy streams and fields to the immediate north and northeast of Cypress Chapel in the agricultural area reclaimed from the Dismal Swamp. The third place visited was the northern edge of the Seashore State Park along Route 60; this is at the northern tip of Cape Henry in

[1] University of Massachusetts, Amherst, and Hollins College, Virginia, respectively. The specimens validating this report are deposited at the authors' respective institutions.

Princess Anne County, east of the city of Norfolk. It includes both swampy forest and sandy, xeric habitats.

The peaks of White Top and Mt. Rogers are bisected by the Smyth-Grayson County line in the southwestern part of Virginia. Their altitudes are 5520 and 5720 feet respectively. The summit of White Top is dominated by nearly a pure stand of *Picea rubens* Sarg. and offers a variety of microhabitats, including exposed rock outcrops such as ledges and small cliffs, some of which remain permanently wet with seepage. Mt. Rogers is capped with almost a pure stand of *Abies fraseri* (Pursh.) Poir., an endemic of the southern Appalachians. Both stands seem to be virgin with windfall thinning the peak of Mt. Rogers. The latter peak is soil covered with occasional shaded, but dry boulder outcrops. White Top is easily reached by a road to the summit whereas Mt. Rogers has been visited much less frequently by botanists since it is approached by an unmarked and rather difficult logging road, and the peak must be ascended on foot.

This report also includes two new records for Virginia made by the authors, independently, at other localities. Since a number of reports below are of a peripheral character establishing these species at new limital points, and since the ecology of the species at such limital points is poorly known, we have given the common associates, and in the case of epiphytic species, the host trees. Since some of the species at the limits of their ranges are often found as impoverished, sterile, and hardly typical phases, we rather fully document the bases for our reports. Thus we hope to avoid the ambiguity that characterizes many local lists.

Lophozia incisa (Schrad.) Dum. Previously reported only from White Top, was found again here on rotten wood with *Anastrophyllum michauxii* and *Tritomaria exsecta*, (RMS *38088, 38100;* PMP *2787*). Mt. Rogers on rotten wood with *Harpanthus scutatus* and *Geocalyx graveolens* (RMS *38035, 38036a, 38043a;* PMP *2759*).

Lophozia silvicola Buch. Bedford County, Peaks of Otter near summit of Sharp Top under a shading rock (RMS *28597*). These plants show the typical narrow-leaved phase, with yellow-green gemmae, and spherical, bi-concentric oil bodies. This species has not been reported previously in North America outside of Minnesota, Wisconsin, and Michigan. Schuster has also found it on Roan Mt., Mt. Mitchell, Mt. Leconte, and Grandfather's Mt. in North Carolina and Tennessee.

Solenostoma (*Plectocolea*) **obscurum** (Evans) Schuster. White Top on

side of cliff at summit (RMS *38073*), male and female plants intermixed with *Scapania undulata;* (RMS *38098*) with *Calypogeia fissa;* (RMS *38051*) with *Marsupella emarginata;* (RMS *38055a*) with *S. undulata;* and (PMP *2790*) with *S. undulata.* The material of *38073, 38098* and *2790* is atypical in the rotundate or nearly rotundate leaves, suggesting *S. hyalinum* which was also collected. However the rhizoids have the intense violet coloration characteristic of *S. obscurum.* In *38098,* a few weathered, but typical perianths are present which are very short and included. The smaller cells, 19–20μ on the margin and 21–34 × 23–30μ medially definitely eliminate *S. hyalinum.* This species has not been reported south of northern New York and the New England states, but Schuster has collected it in both North Carolina and Tennessee.

Nardia lescurii (Aust.) Underw. This was collected from large mats in a shaded roadside ditch in Nansemond County (RMS *34502, 34505, 34507, 34509;* PMP *2686*). Previously reported from the mountains in Botetourt County, and from the outer Piedmont in Spottsylvania County; this is the first report of this primarily montane and Appalachian species from the outer coastal plain. It was associated with *Scapania nemorosa, Microlepidozia sylvatica, Cephalozia macrostachya, Telaranea nematodes, Calypogeia sullivantii, Odontoschisma prostratum, Sphagnum subsecundum* and *Ditrichum pallidum.* The plants were dioecious but bore mature sporophytes. The species is easily distinguished from *N. geoscyphus,* with which it is often confused in the southeast, by the uniformly emarginate leaves, the dioecious inflorescences, and the presence of 2–6 papillose-segmented oil bodies in each cell.

Anastrophyllum (*Sphenolobus*) **minutum** (Cr.) Schuster. White Top on shaded cliff near summit with *Herberta tenuis* and *Bazzania denudata* (RMS *38099*); Mt. Rogers on the shaded vertical face of a large boulder at the lower edge of the Abies fraseri zone, (RMS *38021;* PMP *2752*). This is the first report of this species in Virginia. It occurred in very small quantity but has the typical bright scarlet gemmae masses in *38099.* Nos. *38021* and *2752* are the green shade form with complicate but not cupped leaves with cuspidate lobes. Here the gemmae, apparently owing to development in deep shade, are a pale red.

Marsupella paroica Schuster. White Top on dry rocks and ledges near summit with *Blepharostoma* (RMS *38092, 38064,* PMP *2794.*) Mt. Rogers at very summit with *Tritomaria exsecta, Blepharostoma,* etc. (RMS *38025a*). This is the first report of this recently described species in Virginia. For its description, see Schuster (1957). In the southeast, this species has been confused with *M. emarginata* but can be distinguished by the small size of *M. paroica,* by its paroecious inflorescence, asymmetrically bilobed leaves, and capsule wall anatomy.

Anomylia cuneifolia (Hook.) Schuster (*Mylia cuneifolia* (Hook.) S. F. Gray). Mt. Rogers on trunk of *Abies fraseri,* at summit, in minute quantity; occurring principally as isolated strands among *Frullania asagrayana, Plagiochila tridenticulata, Bazzania nudicaulis, Herberta tenuis* and *Paraleucobryum longifolium* (RMS *38002, 38003, 38011*). This is the

northermost report in the New World of this minute but distinctive species. Previous collections have been from the higher peaks of the mountains of western North Carolina and eastern Tennessee.

Plagiochila sullivantii Gottsche ex Evans. White Top near summit in a damp recess in a cliff with *Metzgeria hamata, Radula tenax* and *Bazzania denudata* (RMS *38083;* PMP *2791*). This collection agrees closely in all respects with the type material except that the caducous leaves are rare or absent. Aside from Sullivant's No. 219 it has been reported in Virginia only from the Shenandoah National Park.

Plagiochila yokogurensis Steph. subsp. **fragilifolia** Schuster. Dismal Swamp on tree trunks with *Radula obconica, R. caloosiensis, Cololejeunea biddlecomiae* (RMS *34561*, PMP *2650*). Nansemond County on bases of trees along swampy streams (RMS *34514*; PMP *2678, 2689*). For a description of this plant see Schuster (1957a). A number of collections, some of which were reported under other specific names for Virginia belong here. Earlier collections in the Dismal Swamp (PMP *1564, 1736*); Spottsylvania County in the outer Piedmont (*Iltis 3806*); in Henry County in the southwestern Piedmont apparently on igneous rock (PMP *1450*); and in the southern Valley region of Virginia on limestone (Rockbridge County, *R. P. Carroll 158*, and Roanoke County, PMP *R-395, 1457*). Virginia and the District of Columbia is as far north as this plant is known to extend.

Cephaloziella byssacea Roth Warnst. var. **scabra** (Howe) Schuster. Seashore State Park in dry, sandy opening under *Quercus virginiana* Mill.; it was dispersed in cushions of *Dicranum condensatum* and *Leucobryum glaucum* (RMS *34557a;* PMP *2669*). This is the first report of the variety in Virginia. The plants were sterile but represent the extreme scabrous phase with very coarse cuticular papillae and cellular outgrowths on the postical face of the leaves. Typical *C. byssacea* was found nearby (RMS *34557*) which was bearing perianths but showed no intergradation with the variety.

Cephalozia macrostachya Kaal. Nansemond with *Nardia lescurii* and other associates listed there (RMS *34506, 34507, 34501, 34509;* PMP *2681*). This has been reported for the state by Evans (material in United States National Museum), and has a sporadic range as yet unreported in the southeastern part of the United States. This plant is not wholly similar to the northern *C. macrostachya,* which grows exclusively in bogs. However it can not be placed in the more common and allied *C. catenulata* because of the very large cells of the stems and leaves. (Schuster 1949). The taxonomy of this complex needs further study.

Microlepidozia sylvatica (Evans) Joerg. Nansemond County on soil, roadside ditch, mixed with *Cephalozia macrostachya, Odontoschisma prostratum, Ditrichum pallidum* and small amounts of *Leucobryum glaucum* and *Atrichum undulatum* (RMS *34501, 34509 p.p.;* PMP *2684*). This species is rare and sporadically distributed in the coastal plain although found as far south as central Florida. The present collections are of particular interest in that some leaf cells and cortical stem cells show several small, homogeneous oil bodies per cell. This finding contradicts

the contention of Müller (1939) that *Microlepidozia* lacks oil bodies. Schuster and Blomquist (1954) have pointed out that the related *M. setacea* also has oil bodies present.

Telaranea nematodes (Gottsche ex Austin) Howe. Nansemond County, at the same site as the above and scattered in small quantity among *Nardia lescurii* and *Cephalozia macrostachya* (RMS *34506, 34516;* PMP *2688*). This has been collected in Virginia in four localities in the coastal plain. It seems to be infrequent as well as easily overlooked.

Calypogeia suecica (Arn. & Perss.) K. Müll. Mt. Rogers on decaying *Abies fraseri* logs with *Cephalozia catenulata* and *Nowellia curvifolia* (RMS *38040;* PMP *2753*). This small species is reported for the first time in Virginia: an earlier report of it is in error. The material is altogether typical. It is rather frequent at high elevations in western North Carolina and eastern Tennessee and has been found by Schuster as far south as the Estatoe River ravine in South Carolina.

Calypogeia neesiana (Massal. & Carest.) K. Müller. White Top, peaty soil over shaded ledges near summit (RMS *38062, 38066, 38071, 38075*); Mt. Rogers, at the lower edge of the fir zone with *C. fissa* (RMS *38020*). The plants of the latter collection are somewhat bluish gray when mature, and dull when dry. This is an extreme phase with the marginal cells of the leaves rarely differentiated. The White Top plants are in part abnormal. No. *38075*, which is in fruit, shows the prominent nodular thickenings of the longitudinal walls of the epidermal cells of the capsule wall and the spores measure 12–13μ. The marginal cells of the leaves are developed locally to a very limited extent. This is also true of No. *38066* which superficially approaches *C. muelleriana* from which this collection is distinct in the dull texture when dry. The plants of No. 38066 have a spring growth of very broad, large-celled, non-bordered leaves which are occasionally incised. The underleaves are somewhat more frequently incised. The material surely belongs here although in many respects it is abnormal. No. *38071* has these same characters but with the underleaves unusually emarginate and with the lateral leaves broad and dense. Here the "border" of the leaves is locally distinct only in the more normal summer or fall growth. No. *38062* shows similar variations in that the spring growth has broad, very polymorphous leaves which are often emarginate at the apex and without the trace of a border. The summer or fall growth, however, has narrower leaves which are often bordered by elongated cells, with underleaves subentire.

This critical series of specimens demonstrates again how exceedingly technical this genus is. This material shows superficial tendencies to grade into *C. muelleriana* (from which it differs in texture and capsule wall anatomy, for instance), but not toward *C. meylanii*, which is as yet unknown from the southern Appalachians.

There is an earlier report of *C. neesiana* from Giles County (Carroll No. *275*). Another collection from Giles County, (PMP *2727*), has the leaf shape, leaf tips and well developed leaf border on most of the leaves that is nearly typical of *C. neesiana*, however the underleaves are bidentate

suggesting *C. muelleriana*. The oil bodies are colorless, compound, chiefly fusiform in shape and rather large, they are mostly 8–11μ long and 4–5 per cell, while some are smaller. They are present in all leaf cells but absent in the underleaves.

Calypogeia sullivantii Aust. Nansemond County, roadside ditch with *Nardia lescurii* etc., (RMS *34502*). It is very unusual to find this plant in the outer coastal plain. It is very largely Appalachian in this area but extending toward the coast northward. The nearest collections in Virginia are on the outer Piedmont in Chesterfield and Henrico Counties.

Calypogeia fissa (L.) Raddi. White Top, on cliffs near summit, traces scattered in *Solenostoma obscurum* (RMS *38098*); Mt. Rogers (RMS *38020a*). This represents the nearctic race, as yet undescribed, with pointed leaves that are only occasionally bidentate; the oil bodies are colorless; the underleaves are transverse, often with obtuse lateral lobes. Some of the southeastern reports of *C. fissa* are in reality *C. portoricense;* thus the southeastern range of *C. fissa* is quite uncertain.

Radula caloosiensis Aust. Dismal Swamp (RMS, *34528 a & b, 34529a, 34531, 34559, 34560, 34532, 34539, 34553a, 34555, 34561a;* PMP *2660, 2664, 2668*). Nansemond (RMS *34503*); Seashore State Park (PMP *2671*). This plant occurred frequently and is associated with *Plagiochila yokogurensis* subsp. *fragilifolia, Cololejeunea biddlecomiae, Rectolejeunea maxonii, Radula obconica,* and such mosses as *Anomodon minor* and *Schwetschkeopsis denticulata.* It was growing on such trees as *Betula lenta, Acer saccharinum, A. rubrum,* and *Nyssa sylvatica* var. *biflora.* This is the first report in Virginia which locality is at its northernmost known limit. This species occurs as the brittle, bronze phase described by Castle (1925) as *R. langloisii.* The study of large quantities of material by Schuster has shown that this plant cannot be separated from *R. caloosiensis* so must be regarded as cospecific.

Frullania inflata Gottsche. Nansemond (RMS *34521b*). Found with capsules and androecia and associated with *Frullania brittoniae, F. squarrosa, Leucolejeunea unciloba* and *Cololejeunea biddlecomiae* and *C. minutissima.* This is a noteworthy citation as it seems to be rare in the state; it has been reported from only three collections in the Piedmont.

Frullania tamariscii (L.) Dum. Dismal Swamp (RMS *34546*). It was growing on *Nyssa sylvatica* var. *biflora* with *Leucolejeunea clypeata.* The plants are typical with female bracts sharply serrated and pointed, the branch leaves with apiculate tips, with large styli, and with the underleaf margins reflexed distally. This is the second report from Virginia.

Frullania plana Sull. Mt. Rogers (RMS *38031a*). Growing on the trunk of a large *Aesculus octandra* 5–7 feet above the base with *Porella platyphylloidea, Radula complanata, Cololejeunea biddlecomiae, Metzgeria fruticulosa.* Reported from four collections in three counties in the western part of the state on boulders, this collection represents the decidedly rare, reddish-brown, corticolous phase of the species.

Frullania saxicola Aust. Roanoke County, on shaded limestone ledge above Tinker Creek near Hollins (PMP *2795*). While this taxon is ex-

ceedingly close to *F. inflata* it is easily separated by the numerous clavate papillae that close the perianth mouth. For a discussion of these differences, see Schuster (1953).

Frullania oakesiana Aust. White Top (RMS *38063, 38068, 38070, 38088a, 38090, 38091;* PMP *2780 & 2783*). Mt. Rogers (RMS *38011, 38014, 38024*). The White Top collections were from *Sorbus americana, Acer spicatum, Betula lutea,* and were associated with *Frullania asagrayana, Metzgeria crassipilis, F. eboracensis, Ulota crispa* and *Sematophyllum adnatum.* The collections on Mt. Rogers grew on *Sorbus americana, Betula lutea* and *Abies fraseri* with *Frullania asagrayana, F. eboracensis, Ulota crispa,* etc. This is a well marked species and occurred in normal condition. It has not been reported south of western New York. This is the first report for Virginia although Schuster has collected it in North Carolina and Tennessee on Roan Mt., Mt. Mitchell, Clingman's Dome and Andrews Bald. In the southern Appalachians it seems to be limited to the spruce-fir zone.

Frullania obcordata Lehm. & Lindb. Dismal Swamp (RMS, several collections; PMP *2659 and 2672 p.p.*). Seashore State Park (RMS *34551a, 34553;* PMP *2674*). The Dismal Swamp collections occurred on *Ilex opaca* in isolated, nearly pure colonies. In Seashore State Park on *I. opaca, Acer rubrum* and *Quercus* with *Frullania kunzei, Leucolejeunea unciloba, Leptocolea cardiocarpa* and *Cololejeunea minutissima.* This species is new to Virginia and this area represents the northernmost known extension in range.

Lejeunea (*Microlejeunea*) **bullata** Tayl. Dismal Swamp (RMS *34545*). It was growing on *Ilex opaca* with *Metzgeria furcata* var. *ulvula* and *Frullania brittoniae.* This is the northernmost valid station for this species and the first report for Virginia. The mature plants have one oil body per cell and median leaf cells are 12–13.5μ wide. The ocelli of the antical leaf base vary from 1–4, usually 2–3 per leaf. The larger number of ocelli are very rarely found, otherwise the plants are quite typical.

Cololejeunea minutissima (Smith) Schiffn. subsp. **minutissima.** Dismal Swamp (RMS *34550, 34552c, 34553, 34556, 34563;* PMP *2653, 2654*); Seashore State Park (RMS *34553 p.p.;* PMP *2676*); Nansemond (RMS *34521*). It was found growing on *Ilex opaca, Nyssa sylvatica* var. *biflora, Asimina triloba,* and *Acer rubrum* with the usual associates including *Leptocolea cardiocarpa, Cololejeunea biddlecomiae, Lejeunea flava, Metzgeria furcata ulvulva, Frullania kunzei,* etc. For the synonymy of the groupings under this species see Schuster (1955). Here also is listed the Virginia collections along with the occurrence of *Frullania obcordata* and *Leptocolea cardiocarpa.* The above is the first report for Virginia and represents its northernmost valid locality. All of these plants are quite typical except that RMS 34530c has the discoid gemmae as illustrated in the paper cited above. These gemmae are 25–32 celled and arise from the antical face of the lobe, on the marginal cells, and on the abaxial face of the lobule.

Leptocolea cardiocarpa (Mont.) Evans. Dismal Swamp (RMS *34529, 34542, 34556, 34563;* PMP *2644, 2657, 2663,* 2665); Seashore State Park

(RMS *34551;* PMP *2675*). Growing on the same types of trees and with the same hepatics as noted above except for the additional occurrence on *Berchemia scandens* where it was growing as isolated small patches. This is another northward extension in range and first report for Virginia.

Riccardia palmata Hedw. White Top (RMS *38053, 38103;* PMP *2774*). It was growing near the summit on a decaying moist log with *R. latifrons, Cephalozia catenulata,* and *Nowellia curvifolia.* The plants are typical, possess capsules and slender androecial plants. Trustworthy reports of this species in the southeast are very few. The majority of the specimens are referable to *R. latifrons* or even *R. multifida* vars.

Metzgeria hamata Lindb. White Top (RMS *38050;* PMP *2773*). On treebase by brook just below the spruce forest at summit. Alt. ca. 5000 ft. Growing with *Lejeunea lamacenna* var. *geminata, Radula tenax,* and *Plagiothecium denticulatum* in beech woods. This tropical species is extremely rare north of the montane parts of Tennessee and North Carolina. The only other report for Virginia is at the Breaks of the Cumberlands at the junction of the Virginia, West Virginia, and Kentucky borders.

Metzgeria fruticulosa (Dicks.) Evans. Mt. Rogers (RMS *38028, 38031;* PMP *2764, 2768*). Near the summit on the barks of *Aesculus octandra, Betula lutea, Fagus grandifolia* and *Acer saccharum,* growing with *Frullania plana, Porella platyphylloidea, Radula complanata, Cololejeunea biddlecomiae, Metzgeria crassipilis, Leucodon julaceus* and *Pylaisia* spp. This species has been reported once before in the state in Giles County. It is extremely rare north of the montane portions of Tennessee and North Carolina, where it has been overlooked previously. It occurs at much higher elevations than the ubiquitous *M. furcata* and has quite a different ecology. The arbitrary position of Frye & Clark (1937) in placing this as a variety of *M. furcata* indicates a lack of understanding of the nature of this species.

Metzgeria myriopoda Lindb. Dismal Swamp (RMS *34529, 34530, 34531, 34541, 34545, 34562, 34537;* PMP *2652*). Growing on *Nyssa sylvatica* var. *biflora* with *Anomodon attenuatus, Radula caloosiensis, R. obconica, Rectolejeunea maxonii;* Nansemond County, as noted for *R. caloosiensis* in similar ecology (RMS *34511, 34514a*). This plant is new to Virginia and is an extension of its range to the north, Frye & Clark's (1937) reports for the District of Columbia and Quebec are in error. The plants are often rather impoverished and approach *M. furcata* from which they differ in the convex branches with the marginal hairs 2–3 per cell. The frequent geminate marginal hairs suggest *M. conjugata* from which the oval, short gemmae and uniform sterility serve to distinguish these plants. Occasional plants (RMS *34537*) exhibit a few ultimate branches, bearing short, oval gemmae and have the facies of a form of *M. fruticulosa.*

Sphaerocarpus terrestris Bisch. (*S. texanus* Aust.). Nansemond, moist, sandy soil near the end of an unplowed field (RMS *36675* PMP *2690*). Colonies small to large and in abundance, with immature sporophytes. This plant has been collected as far north as Middlesex County near Saluda south of the Rappahannock River terminus in minute quantity.

This collection confirms the presence of this species near the edge of its reported range northwards in eastern United States.

It may be noted in passing that previous reports of *Ptilidium ciliare* (L.) Nees for the state, duplicates of which were obtained on loan from the New York Botanical Garden (for which appreciation is here expressed), and examined by the second author, all proved to be *P. pulcherrimum* (Web.) Hampe, a species of scant occurrence in the state. Thus the reported bryophytes for Virginia now stand at 512 with the hepatics at 147.

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MONOTROPSIS LEHMANIAE NOT A REAL SPECIES

J. T. Baldwin, Jr.

Burnham (1906) described *Monotropsis Lehmaniae* as a new species, separated from *M. odorata* Ell. by having the corolla "but half the length of the sepals, and the lobes . . . more deeply divided." Moreover, the flowers of the new plant were scentless and "never appear until about the 20th of September." Burnham's initial impression was that only in the time of flowering did the specimens sent to him by Miss E. A. Lehman from the

region of Elkin, North Carolina, differ from typical *M. odorata* (letter of September 24, 1906, to Miss Lehman, of which a copy is in the Wiegand Herbarium of Cornell University). Almost certainly he based his new species on immature plants of *M. odorata*, and the characters he used to separate the plants change with the ontogeny of the individual and hence are not reliable for taxonomic purposes.

Wolf (1922), after many years of observation of *M. odorata* in Alabama, concluded from misstatements in the literature that the plant was new to science and accordingly described it as *Cryptophila pudica*. Though both Small (1933) and Spawn (1938–1939 ?) correctly cited *Cryptophila pudica* as a synonym under *M. odorata*, neither of these authors seemed to appreciate the value of Wolf's data: his records, in my opinion, clearly demonstrate that *M. Lehmaniae* is a not a true species. Wolf stated: "The season of the plant extends from the fall of the one to the summer of the next year, and is autumno-hyemal with reference to appearance of scapes and their full development, vernal with respect to anthesis, aestival as to ripening of fruit. The earliest date recorded of scapes observed above ground is September 12th . . . The scapes grow slowly to about normal size while the flower buds become fairly developed—sepals more or less to full size, corolla to about two-thirds of the full length. The winter is then passed by the plant in apparent dormancy till March or the approach of April." He observed that a cover of leaf mold was necessary for protection of the plant during the winter.

Monotropsis odorata is a fairly common plant in the environs of Williamsburg, James City County, Virginia (Erlanson, 1924; Artz, 1934; Fernald, 1943). I have known the plant here since 1939 and have come to expect it to appear through the covering of leaves during the latter half of February and to attain full development some weeks later. During the past season I have discovered that by raking away the leaf mold one can find the plant from fall through to the time it normally appears. Plants exposed during the winter were killed.

I have recently examined the following specimens from the Williamsburg stations:

Grimes 3269 NY, Feb. 28, 1921; *3282* GH, March, 1921. *Fernald, Long & Abbe 14209* US, GH, April 19, 1942. *Baldwin 12* GH, Feb. 19, 1939; *12571* US,

Feb. 18, 1949; 15048 NY, K, GH, Feb. 26, 1956; *15086* GH, Nov. 21, 1956; *15087* GH, Dec. 27, 1956; *15088* GH, Dec. 31, 1956; *15089* GH, April 6, 1957.

Baldwin 15088, collected December 31, 1956, has the calyx exceeding the corolla, and the corolla lobes about equal the corolla tube. *Baldwin 15089*, collected on April 6, 1957, from the same colony, has the corolla exceeding the calyx and the corolla lobes half the length of the tube. In other words, in the time interval of more than three months these relative lengths have changed significantly. These are not, therefore, reliable taxonomic characters in *Monotropsis*, but they are used in all the keys that attempt to differentiate among the three species that have been described: *M. odorata*, *M. Lehmaniae*, and *M. Reynoldsiae* (A. Gray) Heller.

As the name connotes, *M. odorata* has odoriferous flowers. Copeland (1939) claimed that various writers, beginning with Stephen Elliott who described the species, have mentioned that the flowers smelled like violets. Plitt (1909) wrote that as he knew the plant in Maryland it had a "delightful fragrance, clover-like . . . perfuming the air for some distance around." A. V. Smith (conversation) said that he had on occasion in Maryland found the plant by first detecting the aroma. Wolf (1922) considered that his Alabama plant had an odor of cloves. A notation on *A. M. Huger* 17 NY—a specimen of *M. odorata* collected near Hendersonville, North Carolina, in 1898, reads: "Is *always* deliciously fragrant—a very *rich & spicy* odor." This last description coincides with my concept of the plant at Williamsburg except that specimens collected in November and December of 1956 (cited above) had no discernible odor.

Baldwin 15086 consists of several plants discovered under a rotten log which W. Leslie Burger turned over in search of herpetological specimens; though these plants were kept in a warm laboratory for a number of days, they developed no odor. *Baldwin 15087* consists of plants from the same colony as *15086* and were odorless; they were found by raking away the leaf-mold cover. *Grimes 3282* was found at the same station in March, 1921: "Shore of Tutters Neck Pond, S. E. Williamsburg"; M. L. Fernald (letter of June 27, 1949, to me) identified *Grimes 3282* as *M. odorata*. The specimens constituting *Baldwin 15088* were found just west of Williamsburg by raking away leaves and debris; they came from the same colony that supplied specimens

for *Baldwin 12571*, *15048*, and *15089*. The last three numbers had the odor that characterizes the species; no odor could be detected for *15088*. The conclusion seems inescapable that *M. odorata* does not have its fragrance until anthesis, *i.e.*, in late winter and spring. Miss Lehman, collecting the immature plants upon which Burnham founded his species, correctly noted that they were scentless.

Neither morphological characters of flowers, nor time of flowering, nor absence of odor are legitimate bases for maintaining *M. Lehmaniae* as a good species.

Spawn's (1938–1939 ?) distribution map for the representatives of *Monotropsis*, already weak at the time of publication because of inadequate attention to collections and careful records, needs further revision if my reduction of *M. Lehmaniae* is accepted.

College of William and Mary
Williamsburg, Virginia

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Echinochloa Walteri in Concord, Massachusetts.—Attention previously has been called to the probable effect of sewage pollution of the Sudbury-Concord River system in eastern Massachusetts on certain elements of its aquatic and riparian vegetation assumed to be due to a change from a natural slightly acid to a neutral or even basic environment supplied by the decomposition of sewage wastes. (Eaton, 1947).

Another probable inst· .ce of this phenomenon is suggested by what I imagined to be t! nitial discovery in 1956 of an abundant stand of *Echinochloa Walteri* (Pursh) Nash on moist gravel along a low impoundment dyke at the Great Meadows National Wildlife Refuge in Concord. A specimen collected by the author on September 10, 1956, has been placed in the Herbarium of the New England Botanical Club. Professor G. L. Church has kindly verified the determination.

Because the species occurs chiefly in basic to alkaline marshes, swamps and shallow water and appears to be local and uncommon north of Cape Cod, I have explored the possibility that it may have been an intentional or casual introduction in connection with recent wild fowl management and research activities at the Refuge. Correspondence with the Refuge Manager (Mr. Gorton Nightingale) and the Project Leader, Massachusetts Division of Fisheries and Game Field Headquarters (Mr. David Grice), elicited the information that a few plants were noted on the spoil bank of an artificial ditch in the meadows by Dr. John W. Brainerd in August, 1950. The ditch was blasted in October, 1949. Furthermore, a student assistant, Mr. Waldo Kennedy, is quoted as reporting its occurrence in two areas of the meadows in 1950, regarding its abundance to be "4" in each area. For a matter of comparison, he also designated *Carex comosa*, *Cicuta bulbifera*, *Bidens* spp. as "abundance 4." From my own observation these latter species are common in the Great Meadows wherever conditions are suitable. Hence, it seems likely that *E. Walteri* occurred there in 1950 not uncommonly in several and perhaps many localities. Nightingale writes, "This station's records disclose no planting of any sort done at the Great Meadows refuge by the Federal Government at any time and more specifically since its acquisition in 1944." Grice writes, "The state has made no plantings of any kind at Great Meadows," except for a small seeding of *Bromus* sp. in the summer of 1955 in the course of repairs to the lower dyke about one half mile downstream. Grice did bait his duck-banding traps with whole kernel corn (maize), occasionally substituting cracked corn or scratch feed, and in 1951 experimenting with barley and buckwheat. The scratch feed was a standard Wirthmore product tagged as containing cracked corn, wheat, oats and barley. It, as well as the barley and buckwheat, was supplied by a West-

boro grain dealer who writes "There is a possibility that some other seed which we sell may have fallen into the scratch feed we sold Mr. Grice. Most likely, if any did it would be Jap Millet, Hungarian Millet, Timothy, Red Top, Alsike Clover, Red Clover, Winter Rye, or Buckwheat." These are all commercial grains or grasses raised mostly on inland farms for the seed trade. I consider it reasonable to dismiss from consideration the possibility of their contamination with a native coastal plain species chiefly of basic to alkaline marshes and shallow water, which apparently seldom exhibits a weedy behavior.

It should be noted at this point that the Great Meadows are usually covered by the flood waters of the river from January through April. When the waters recede below the dykes, the shallow impoundments are chiefly fed by a small brook and all the filtrates from adjacent filter beds maintained by the Concord Sewer Department serving a population of some 10,000 people.

This grass, occurring chiefly in basic to alkaline marshes, swamps, and shallow water, ranges northward from Texas and Florida along the coastal plain to southern New England and disruptedly from southwest Quebec, central New York, to Wisconsin and Minnesota—a familiar distributional pattern. A significant number of these southern coastal plain plants reach the Merrimac River estuary (or beyond) and extend up its valley into southern New Hampshire and up its tributary, the Concord River, to Concord, Massachusetts, where they are usually uncommon and local. In the latter category, for example, are *Lycopodium inundatum* var. *Biglovii*, *Iris prismatica*, *Hibiscus palustris*, *Viola Brittoniana*, *Vernonia noveboracensis*, *Mikania scandens*, and *Liatris borealis*.

Thus it is not unreasonable to suggest that *Echinochloa Walteri* formerly was sparingly indigenous in Concord, although previously overlooked even by that indefatigable amateur student of Concord grasses of one hundred years ago, Mr. Edward S. Hoar, whose collections are preserved in the Club Herbarium. With the onset of river pollution ecological conditions, seemingly, have become more favorable for its development. Its present abundance, at least at the station where it was discovered, is somewhat confidently explained as a response to the pollution which also seems to account for the remarkable development of *Lemna*

minor and *Trapa natans* (op. cit.), the appearance of *Wolffia columbiana* in abundance (Eaton, 1939), as well as the increasingly conspicuous occurrence of *Potamogeton pusillus* (*P. panormitanus* Biv., cf. Eaton & Griscom, 1934), and *Phragmites communis* var. *Berlandieri* (Eaton, 1952).—RICHARD J. EATON, LINCOLN, MASSACHUSETTS.

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POLYGONUM BICORNE RAF. INSTEAD OF P. LONGISTYLUM SMALL.—*Polygonum longistylum* is a rather showy species, common in the Gulf Southwestern states. One would expect that such a plant must surely have been noticed earlier than 1894, when it was described by Small (Bull. Torr. Bot. Club **21**: 169; in 1903 transferred to *Persicaria*, in Fl. S. E. U. S. 377, 1330). As might be expected, the much abused Rafinesque had named it in his *Florula Ludoviciana*, p. 29, 1817, with a description that for him was exceptionally full and clear: "Caulibus ramosis, ramis geniculatis, patulis, teretibus, intus crenulatis; foliis petiolatis, lanceolatis, glabris; floribus spicatis confertis octandris, distylis, staminis inclusis, stylis exertis elongatis. Raf.—Renouée 1. Rob. p. 366. Large plant, four or five feet high, branches purplish, every one of which bears a fine, thick spike, about three inches long, of rose coloured flowers. This species, and all the following, grow in swamps, moist grounds, and along the rivers; they are called vulgarly *Curages*, in Louisiana; all their flowers smell like honey, and afford it in plenty to the bees. Blossoms from August to September." Later, under *P. vernum*, he adds: "This species, as well as the *P. bicorne* and *P. maculatum*, above, belong to the subgenus *Dioctus*, distinguished by having eight stamina, a compressed ovary and seed, two styles or stigmas, & c." In 1914 the new combination *Persicaria bicornis* (Raf.) Nieuwland was published

(Amer. Midl. Nat. **3:** 201), but otherwise Rafinesque's species has been completely ignored. This is a consequence of prejudice and ignorance; his description is unmistakable. The special condemnation of the *Florula Ludoviciana*, on the grounds that Rafinesque did not visit the state and saw no specimens, but named species on the basis of inadequate descriptions, is quite unjustified. Robin, upon whose *Flore Louisianaise* Rafinesque based his publication, was a serious amateur botanist who had studied Jussieu's textbook. He tells us that every description was made in the field, with the living plant before him ("Elles ont été faites sur les lieux, au milieu des bois et des prairies, et toujours en présence de l'objet que je décrivais. Si elles se ressentent à beaucoup d'égards des incommodités que j'ai dû éprouver, du moins elles ont pour elles la fidelité . . ."). Most of his descriptions are quite long—much longer than the abridged ones of Rafinesque. Though local uses of plants often make up a considerable portion of his accounts, the botanical information is still considerable—more ample, it may be remarked, than is to be found in Walter's *Flora Caroliniana*, which has been spared the obloquy awarded to Rafinesque. Even Linnaeus cites many descriptions from Bauhin and others which are far less intelligible than most of Rafinesque's, and Robin's originals are far more than we get in many sources quoted by Linnaeus. And Linnaeus likewise, in case after case, saw no specimens and never visited the native country involved. In further defense of the *Florula Ludoviciana*, it should be pointed out that the region covered is really quite restricted, and the main part of it relatively well known botanically: hardly a quarter of a century after its publication, considerable topotype material was available, by means of which the species could have been evaluated. Robin spent most of his stay in and around New Orleans, making only two long trips into the back country: one in early spring, up the Mississippi, Red, and Ouachita rivers to present Monroe, Louisiana; another just after mid summer (it was necessary to wait until the marshy country was dry enough for travel) nearly due west from New Orleans about half way across the state, then a little north to "the country of the Atakapas," to the south of present Opelousas. The deliberate disregard of nearly all of Rafinesque's

Louisiana species resulted from several causes, which unhappily still exist: a hostile prejudice against the man and his work; the rarity of copies of Robin's *Voyages* (no botanist to my knowledge went to the trouble of checking back to the original source; the lie that the descriptions were scrappy and inadequate has been monotonously repeated by persons who never saw Robin's 3-volume book); the paucity of collections and general lack of information (especially first-hand field acquaintance) about the Louisiana flora. On the basis of such limited studies as I have made so far, I am confident that most of the species of the *Florula Ludoviciana* can be satisfactorily identified. Since its early date (1817) gives it priority over most of the work of Elliott and all of that of Nuttall, Torrey, and Gray, there will undoubtedly be further name changes. Rafinesque himself did eventually see specimens from Louisiana, and was able to supply additional notes or confirmations for some of his *Florula Ludoviciana* species in the *New Flora of North America* and *Autikon Botanikon*. It is worth citing one extraordinary case in which Rafinesque was an excessive lumper. His *Oxalis sanguinolaria* (*Fl. Ludov.* 89) included what Robin had listed as two distinct species, not named. Rafinesque's abridged description makes it impossible to assign his name with precision. But Robin's ampler descriptions, for anyone who has seen the southeastern Louisiana spring flora, leaves not the slightest doubt that he was describing the very distinct *O. recurva* Ell. and *O. Dillenii* Jacq. var. *radicans* Shinners (for a key to these, see Field & Lab. **24:** 39–40, 1956). Rafinesque had been too conservative, and *Oxalis sanguinolaria* must be rejected as based on an inextricable mixture.—Lloyd H. Shinners, southern methodist university, dallas 5, texas.

Dentaria laciniata from Seed.—In a paper on the genus *Dentaria* in eastern North America, Montgomery* ascribes sterility to certain species, among these *D. laciniata*. He states that "pods may develop to a good size, but when the contents are examined, they will most frequently be found to contain aborted ovules," and that apparently mature seeds of *D. laciniata*

* Montgomery, F. H. 1955. Preliminary studies in the genus *Dentaria* in eastern North America. Rhodora **57**: 161–173.

from Ontario failed to germinate. Examination of pollen showed that "good pollen was the rule," but hand-pollination (both self-pollination and cross-pollination) was unsuccessful. It was found that disintegration of the cells of the embryo sac took place after reaching the 8-celled stage, resulting in abortion of ovules. The conclusion was reached that "the eastern North American species of *Dentaria* proved to be another example of a polyploid series [*D. laciniata* from Guelph, Ont., had 240 chromosomes] being sexually sterile" and that "undoubtedly they reproduce mostly, if not entirely, apomictically by vegetative reproduction, for which the nature of the rhizome seems admirably suited."

The question at once came to mind—if *D. laciniata* reproduces only vegetatively, how has it succeeded in migrating so far in post-Wisconsin time, and how can it be such a rapid and aggressive invader of disturbed woodlands?

Although *D. laciniata* may be sexually sterile in Ontario, it is not so in southern Ohio. In the spring of 1956, with the above question in mind, patches of flowering plants were examined and, in each case, some small plants with entire elliptic leaves were found. Below ground, these were connected with the germinated seed, the seed-coat, though torn, still recognizable. As a further check, seeds were collected later as they matured. Seeds are produced abundantly, and forcibly thrown to a distance of several feet by the sudden splitting and curling of the halves of the silique. Collection of several hundred seeds was easily accomplished by placing almost ripe inflorescences under a bell-jar to prevent escape of seeds.

Attempts to germinate the fresh seed in moist chambers were unsuccessful; refrigeration did not help. In consequence, seeds were planted in the open under natural conditions, one lot on May 30, another (of refrigerated seed) on July 14. In the fall, some of the seeds were dug up, but germination had not taken place. Early in March, 1957, leaves began to appear above ground in both plots. Viability was high, at least 80 per cent.

The seedling *D. laciniata* has unlike cotyledons; one is fleshy and remains in the seed-coat, the other grows a long slender petiole (length dependent on depth of humus or leaf-litter overlying seed bed) which pushes above ground as a narrow arch,

the young leafblade bent back parallel to the petiole, and hence is pulled out of the ground, after which it assumes an upright position. This single emergent cotyledon has an entire elliptic blade 3–10 mm. long. The plumule, at first inconspicuous, soon begins to develop into a rhizome which by mid-April may be several mm. in length. At this time, the subterranean cotyledon in the torn seed-coat is still present. Occasionally a leaf with entire or lobed blade arises from the young rhizome. More often, the green plant the first year has only the one emergent cotyledon. By late May, the seedlings die down; at this time the young rhizomes are about 5 mm. long.

The number of chromosomes of the sexually fertile southern Ohio plants has not been determined. It is entirely possible that they do not display as high polyploidy as do the more northern plants. *D. multifida* was shown to have different numbers in different specimens ($2n = 64$ and $\pm$ 112). Sexual fertility of *D. laciniata* (and perhaps of other species southward) necessitates a reconsideration of the question of hybrid origin of certain forms. It explains the rapid migration of the species.—E. Lucy Braun, Cincinnati, Ohio.

A New Botanical Masterpiece from Denmark.[1]—Although on this side of the Atlantic we are not accustomed to seeing first-class illustrated floras or pictorials of plants, the European countries have long been known for their superbly illustrated floras. Perhaps this is a part of the secret affecting the considerably more widespread interest in botany on the eastern side of the ocean. Descriptions in words never can be made so explicit, even by a skilled taxonomist, that others, especially amateurs, do not have greater difficulties in identifying the plant than if pictures are included. Even a relatively inexact drawing is more desirable than are the most exact of terms, not only for the layman interested in naming the plants he finds but also for the specialist. This principle was understood by the first botanists, although most of their illustrations are not always impressive to their more sophisticated colleagues of to-day. Too many authors of floras in modern times seem to prefer many words instead of a simple picture.

The first printed herbals of the 16th century are often at the same time collections of artistic drawings, some of which were made by the greatest artists of the Netherlands. Some of these flower pictures by renaissance

[1] Botanisk Atlas. Danmarks daekfröede planter tegnede af Olaf Hagerup og Vagn Peterson.—Ejnar Munksgaard, Köbenhavn, 1956. 550 pp.

artists are still unsurpassed in their artistic quality, although it was not until the Linnaean system had been generally accepted that the scientifically most valuable botanical picture collections were published.

The largest and certainly the most superb of all pictorials ever published of the flora of a single country is the Flora Danica, which was begun by Professor Oeder in Copenhagen in 1761 and continued by several other Danish botanists during the 122 years that followed. This pictorial consists of 3240 large engravings of the higher and many lower plants of the Danish empire, including not only Denmark itself, but also Norway, the Faeroes, Iceland, Greenland, and the Danish West Indies (Virgin Islands). Many of the best artists of Denmark here made their everlasting contributions. A number of the volumes were also hand-colored by the artists. Pictures from Flora Danica hang on the walls of many outstanding homes in Scandinavia, and they were once used on Danish porcelain meant for the Russian court. A complete series of Flora Danica, uncolored, now costs several thousand dollars, while the rare colored editions are priceless.

Flora Danica never became popular, since its price was too high even for most botanical institutions. In this century, however, several Scandinavian institutions and homes were able to keep the series of more simple and smaller colored drawings of the flora of this part of Europe, initiated by the Swedish Professor Lindman. It was, however, not until the invention of the modern methods of reproduction of color photographs that such books became very popular. In America we have seen a great number of such books of low quality scientifically as well as artistically although some few first-class pictorials have been produced. But the undoubtedly highest quality in such books has been reached by the five magnificent volumes, "Vilda växter i Norden," initiated by the Swedish Professor Lagerberg and already published in two large editions in all the Scandinavian countries. Of high quality also is the popular flora of Sweden by Ursing based on colored drawings from color photographs, although its pictures are very small and not always very exact. This last book was a best-seller in Sweden—topping even the very best novels—for several years after the last war, and is probably found in the majority of Swedish homes.

Although the pict[illegible]ased on color photographs can be excellent, they never come up to [illegible] quality of the best drawings, and, because of their high printing price, the color pictures cannot be included in the common flora manuals. Therefore, despite the popularity of the colored pictorials, they have not eradicated the black-white drawings as botanical illustrations, but rather have enhanced their further development. Recent illustrations of this kind have been published in many European countries, but although the quality of them all has been kept very high, hardly any of them are characterized by the high scientific and artistic quality that is met with in the pictures by Dagny Tande Lid in the Norwegian flora by Lid, the Icelandic flora by Löve, and the Faeroes flora by Rasmussen.

The drawings by Mrs. Lid rarely fill a page, and some botanists have the feeling that they are reduced more than desirable although this cannot be avoided if the text is to be printed on the same pages. Therefore, in Norway and Great Britain somewhat larger illustrations are being published by Miranda Bödtker and Nordhagen, and Stella Ross-Craig, respectively, referring to already published manuals for the text. Both these publications are of the highest quality, although it must be said that their greatest disadvantage is their publication in small parts with long intervals between issues so that the complete floras will not be covered within a reasonable period of time.

Another work of this kind, though at once picturing all the higher plants of its region, has just been published in Denmark. It is a quarto-volume of 550 pages named "Botanisk Atlas," by Olaf Hagerup and Vagn Peterson. The first author is the head curator of the Botanical Museum in Copenhagen, the world-renowned author of a large number of scientific contributions, and the creator of some of the most fruitful ideas of modern botany, such as the hypothesis of difference in distribution of diploids and polyploids. The second author is an amateur botanist and an artist of high merit. Hagerup is responsible for the scanty text, the arrangement, the nomenclature, and all the many pictures of details and anatomical features, whereas Peterson has made the drawings of the entire plants and their main parts. Without going into detail, it can be stated that this new Atlas is comparable to nothing but the very best drawings in the classical Flora Danica, and even surpasses it many times in scientific exactness and perhaps also in the artistic quality of the detailed pictures drawn by Hagerup.

The text of the new Danish Atlas is as short as it can be, including the names of the plants in Danish and Latin, and very dry and short explanations of the figures. Somewhat more detailed descriptions are given of some of the pictures of characters typical of the families, and more particular information on the pollinating mechanisms—a speciality of Hagerup—is often included so that the reader here gets a small but very fascinating scientific report on these matters, some, at least, not previously published.

It cannot be expected that all the many drawings could be of the same high quality, and some of the pictures are perhaps rather dull and expressionless. This reviewer feels so about *Acorus Calamus*, which is shown only as a piece of the spathe with a spadix, and the same is true for *Rumex Acetosella*, which here cannot be separated from *R. tenuifolius* although the individual on which the drawing is based very probably belonged to the latter species. But the great majority of the pictures are of such a high quality that they can neither be described nor criticized, and especially all the drawings of details are so superb that nothing comparable to them has ever been published in such a book.

Because of Flora Danica, the Danish botanists have long been favored by being the owners of the most excellent and artistic pictorial ever published. Thanks to the united efforts of Hagerup and Peterson, their

publisher Ejnar Munksgaard, and the printer O. C. Olsen & Co., they are now also the possessors of the most valuable botanical atlas hitherto produced. It is indispensible not only for all European institutions, but also for all American botanists who need to make comparisons between American and European material. The Danish language is no obstacle to a foreign botanist since Latin names are international and almost all the details are self explanatory.—Áskell Löve. Institut botanique de l'université de montréal, montréal, québec.

A Needed Revision.[1]—This revision was started with Dr. Ogden shortly before Dr. Fassett's death, and offers a revision appendix to bring the taxonomy and nomenclature into agreement with present usage. The manual remains largely the same as the first edition. It is not a complete overhaul.

The appendix concerns not only changes in nomenclature, but corrects references to many illustrations in the main text. It adds references that have appeared since 1940, and provides supplementary keys which take into consideration recent taxonomic reviews.

The inclusion of the detailed changes, made necessary by the appearance of the recent monumental floras of the Northeastern United States, will make this much more convenient to use.

On the jacket of this manual is given a formal definition of an aquatic plant, but Dr. Fassett's real definition was "one that appears in my book." This nicely expresses both the importance of this, the outstanding treatment of the aquatic plants of North America, and something of Dr. Fassett's pleasant sense of humor.—W. H. Drury, Jr., Lincoln, Mass.

[1] A Manual of Aquatic Plants, by Norman C. Fassett, with revision appendix by Eugene C. Ogden. The University of Wisconsin Press, Madison, Wisconsin, 1957; ix plus 405 pp. at $6.50.

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